



DEPARTMENT OF TRANSPORTATION

Federal Aviation Administration

14 CFR Part 39

[Docket No. FAA-2021-0662; Project Identifier MCAI-2021-00031-E; Amendment 39-21943; AD 2022-04-02]

RIN 2120-AA64

Airworthiness Directives; Rolls-Royce Deutschland Ltd & Co KG (Type Certificate previously held by Rolls-Royce plc) Turbofan Engines

AGENCY: Federal Aviation Administration (FAA), DOT.

ACTION: Final rule.

SUMMARY: The FAA is adopting a new airworthiness directive (AD) for certain Rolls-Royce Deutschland Ltd & Co KG (RRD) Trent 1000 model turbofan engines. This AD was prompted by reports of high levels of wear on the seal fins on a small number of certain high-pressure turbine triple seals. This AD requires manual deactivation of the modulated air system (MAS) control valves. The FAA is issuing this AD to address the unsafe condition on these products.

DATES: This AD is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

The Director of the Federal Register approved the incorporation by reference of a certain publication listed in this AD as of [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

ADDRESSES: For service information identified in this final rule, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, DE24 8BJ, United Kingdom; phone: +44 (0)1332 242424; fax: +44 (0)1332 249936; website: <https://www.rolls-royce.com/contact-us.aspx>. You may view this service information at the FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110. It is also available at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0662.

Examining the AD Docket

You may examine the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0662; or in person at Docket Operations between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays. The AD docket contains this final rule, the mandatory continuing airworthiness information (MCAI), any comments received, and other information. The address for Docket Operations is U.S. Department of Transportation, Docket Operations, M-30, West Building Ground Floor, Room W12-140, 1200 New Jersey Avenue SE, Washington, DC 20590.

FOR FURTHER INFORMATION CONTACT: Kevin Clark, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7088; fax: (781) 238-7199; email: kevin.m.clark@faa.gov.

SUPPLEMENTARY INFORMATION:

Background

The FAA issued a supplemental notice of proposed rulemaking (SNPRM) to amend 14 CFR part 39 by adding an AD that would apply to certain RRD (Type Certificate previously held by Rolls-Royce plc) Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, Trent 1000-H3, Trent 1000-J3, Trent 1000-K3, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3, and Trent 1000-R3 model turbofan engines. The SNPRM published in the *Federal Register* on November 05, 2021 (86 FR 61083). The SNPRM was prompted by the notice of proposed rulemaking (NPRM) being placed in incorrect Docket No. FAA-2021-0637 instead of Docket No. FAA-2021-0662, which caused some commenters to experience difficulty commenting on the NPRM. In the SNPRM, the FAA proposed to require manual deactivation of the MAS control valves. The FAA is issuing this AD to address the unsafe condition on these products.

The European Union Aviation Safety Agency (EASA), which is the Technical Agent for the Member States of the European Union, has issued EASA AD 2021-0009, dated January 8, 2021 (referred to after this as “the MCAI”), to address the unsafe condition on these products. The MCAI states:

The Modulated Air System (MAS) optimises cooling air, extracted from the compressor, where full flow is not required at cruise conditions. It is only active during cruise. Recently, occurrences have been reported of finding high levels of wear on the seal fins on a small number of high pressure turbine triple seals, Part Number FW34485. The effect on the secondary air system was conservatively assessed due to the resultant increased turbine cooling air leakage, which changes the cooling flow around the intermediate pressure (IP) turbine disc.

This condition, if not corrected, could lead to temperature increase at the IP turbine disc rim when the MAS is active, possibly resulting in IP turbine disc failure and high energy debris release, with consequent damage to, and reduced control of, the aeroplane. To address this potential unsafe condition, Rolls-Royce has issued the NMSB, providing instructions to manually 'lock-out' (deactivate) the MAS control valves.

For the reason described above, this [EASA] AD requires to deactivate the MAS control valves. This [EASA] AD also specifies that the Master Minimum Equipment List (MMEL) item for 'MAS inoperative', which has a limit of 120 days, does not apply when the system is manually deactivated.

You may obtain further information by examining the MCAI in the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0662.

Discussion of Final Airworthiness Directive

Comments

The FAA received a comment from one commenter, Roll-Royce plc (RR). The following presents the comment received on the SNPRM and the FAA's response to the comment.

Request to Consider Improved Solution as a Terminating Action

RR stated that it has no objections to the SNPRM as written but requested that the FAA consider an improved solution that is being developed by RR as a terminating action for this AD. RR noted that the improved solution would permanently deactivate the MAS system without initiating engine indicating and crew alerting system (EICAS) messages. RR reasoned that deactivation of the MAS was introduced as an immediate containment action; however, this solution produces spurious EICAS messages, indicating a malfunction in the MAS system. As a result, operators are instructed not to follow the minimum equipment list instructions and limitations.

The FAA will consider the improved solution as a possible terminating action and may consider future rulemaking once the improved solution becomes available. The FAA did not change this AD as a result of this comment.

Conclusion

The FAA reviewed the relevant data, considered the comment received, and determined that air safety and the public interest require adopting this AD as proposed. Accordingly, the FAA is issuing this AD to address the unsafe condition on these products. This AD is adopted as proposed in the SNPRM.

Related Service Information under 1 CFR Part 51

The FAA reviewed Rolls-Royce Alert Non-Modification Service Bulletin Trent 1000 75-AK642, Initial Issue, dated November 30, 2020. The service information specifies procedures for deactivating the MAS control valves. This service information is reasonably available because the interested parties have access to it through their normal course of business or by the means identified in ADDRESSES.

Costs of Compliance

The FAA estimates that this AD affects 4 engines installed on airplanes of U.S. registry.

The FAA estimates the following costs to comply with this AD:

Estimated costs

Action	Labor Cost	Parts Cost	Cost per product	Cost on U.S. operators
Deactivate the MAS control valves	2 work-hours x \$85 per hour = \$170	\$0	\$170	\$680

Authority for This Rulemaking

Title 49 of the United States Code specifies the FAA's authority to issue rules on aviation safety. Subtitle I, section 106, describes the authority of the FAA Administrator. Subtitle VII: Aviation Programs, describes in more detail the scope of the Agency's authority.

The FAA is issuing this rulemaking under the authority described in Subtitle VII, Part A, Subpart III, Section 44701: General requirements. Under that section, Congress charges the FAA with promoting safe flight of civil aircraft in air commerce by prescribing regulations for practices, methods, and procedures the Administrator finds necessary for safety in air commerce. This regulation is within the scope of that authority because it addresses an unsafe condition that is likely to exist or develop on products identified in this rulemaking action.

Regulatory Findings

This AD will not have federalism implications under Executive Order 13132. This AD will not have a substantial direct effect on the States, on the relationship between the national government and the States, or on the distribution of power and responsibilities among the various levels of government.

For the reasons discussed above, I certify this AD:

- (1) Is not a "significant regulatory action" under Executive Order 12866,
- (2) Will not affect intrastate aviation in Alaska, and
- (3) Will not have a significant economic impact, positive or negative, on a substantial number of small entities under the criteria of the Regulatory Flexibility Act.

List of Subjects in 14 CFR Part 39

Air transportation, Aircraft, Aviation safety, Incorporation by reference, Safety.

The Amendment

Accordingly, under the authority delegated to me by the Administrator, the FAA amends 14 CFR part 39 as follows:

PART 39 - AIRWORTHINESS DIRECTIVES

1. The authority citation for part 39 continues to read as follows:

Authority: 49 U.S.C. 106(g), 40113, 44701.

§ 39.13 [Amended]

2. The FAA amends § 39.13 by adding the following new airworthiness directive:

2022-04-02 Rolls-Royce Deutschland Ltd & Co KG (Type Certificate previously held by Rolls-Royce plc): Amendment 39-21943; Docket No. FAA-2021-0662; Project Identifier MCAI-2021-00031-E.

(a) Effective Date

This airworthiness directive (AD) is effective [INSERT DATE 35 DAYS AFTER DATE OF PUBLICATION IN THE FEDERAL REGISTER].

(b) Affected ADs

None.

(c) Applicability

This AD applies to Rolls-Royce Deutschland Ltd & Co KG (RRD) (Type Certificate previously held by Rolls-Royce plc) Trent 1000-AE3, Trent 1000-CE3, Trent 1000-D3, Trent 1000-G3, Trent 1000-H3, Trent 1000-J3, Trent 1000-K3, Trent 1000-L3, Trent 1000-M3, Trent 1000-N3, Trent 1000-P3, Trent 1000-Q3, and Trent 1000-R3 model turbofan engines.

(d) Subject

Joint Aircraft System Component (JASC) Code 7250, Turbine Section.

(e) Unsafe Condition

This AD was prompted by reports of high levels of wear on the seal fins on a small number of certain high-pressure turbine triple seals. The FAA is issuing this AD to ensure cooling airflow restoration to the intermediate-pressure turbine (IPT) disk rim during cruise by deactivating the modulated air system (MAS). The unsafe condition, if not addressed, could result in a temperature increase at the IPT disk rim when the MAS is

active during cruise, resulting in failure of the IPT disk, loss of engine thrust control, and loss of the airplane.

(f) Compliance

Comply with this AD within the compliance times specified, unless already done.

(g) Required Actions

Within the compliance time specified in figure 1 to paragraph (g) of this AD, deactivate the MAS control valves using the Accomplishment Instructions, paragraphs 3.A.(6) and 3.A.(7), of Rolls-Royce Alert Non-Modification Service Bulletin Trent 1000 75-AK642, Initial Issue, dated November 30, 2020.

Note 1 to paragraph (g): Deactivation of the MAS control valves on an engine required by paragraph (g) of this AD changes the engine to an approved configuration that will produce engine indicating and crew alerting system (EICAS) status messages “ENG MAS VALVE L/R” and “ENG MAS SYS TEST L/R.” Since MAS is purposely disabled after compliance with paragraph (g) of this AD, these status messages do not indicate inoperative (failed) equipment and, consequently, the operator’s existing FAA-approved minimum equipment list (MEL) instructions and limitations, including the 120-day operation limitation, do not apply.

Note 2 to paragraph (g): Deactivation of the MAS control valves on an engine as required by paragraph (g) of this AD does not produce the EICAS status message “ENG MAS VALVE SENSOR L/R.” Consequently, when this EICAS message displays, it remains indicative of inoperative equipment, even if the MAS has been disabled as required by paragraph (g) of this AD. As a result, the corresponding MEL instructions and limitations apply whenever the EICAS status message “ENG MAS VALVE SENSOR L/R” is displayed.

Figure 1 to paragraph (g) – Compliance time

MAS deactivation option	Compliance time, whichever occurs later after the effective date of this AD, A or B
A	Within 50 engine flight cycles (FCs) since new
B	Within 30 days or 100 FCs, whichever occurs first

(h) Alternative Methods of Compliance (AMOCs)

(1) The Manager, ECO Branch, FAA, has the authority to approve AMOCs for this AD, if requested using the procedures found in 14 CFR 39.19. In accordance with 14 CFR 39.19, send your request to your principal inspector or local Flight Standards District Office, as appropriate. If sending information directly to the manager of the ECO Branch, send it to the attention of the person identified in paragraph (i)(1) of this AD and email to: ANE-AD-AMOC@faa.gov.

(2) Before using any approved AMOC, notify your appropriate principal inspector, or lacking a principal inspector, the manager of the local flight standards district office/certificate holding district office.

(i) Related Information

(1) For more information about this AD, contact Kevin Clark, Aviation Safety Engineer, ECO Branch, FAA, 1200 District Avenue, Burlington, MA 01803; phone: (781) 238-7088; fax: (781) 238-7199; email: kevin.m.clark@faa.gov.

(2) Refer to European Union Aviation Safety Agency (EASA) AD 2021-0009, dated January 8, 2021, for more information. You may examine the EASA AD in the AD docket at <https://www.regulations.gov> by searching for and locating Docket No. FAA-2021-0662.

(j) Material Incorporated by Reference

(1) The Director of the Federal Register approved the incorporation by reference (IBR) of the service information listed in this paragraph under 5 U.S.C. 552(a) and 1 CFR part 51.

(2) You must use this service information as applicable to do the actions required by this AD, unless the AD specifies otherwise.

(i) Rolls-Royce Alert Non-Modification Service Bulletin Trent 1000 75-AK642, Initial Issue, dated November 30, 2020.

(ii) [Reserved]

(3) For Rolls-Royce service information identified in this AD, contact Rolls-Royce plc, Corporate Communications, P.O. Box 31, Derby, DE24 8BJ, United

Kingdom; phone: +44 (0)1332 242424; fax: +44 (0)1332 249936; website:
<https://www.rolls-royce.com/contact-us.aspx>.

(4) You may view this service information at FAA, Airworthiness Products Section, Operational Safety Branch, 1200 District Avenue, Burlington, MA 01803. For information on the availability of this material at the FAA, call (817) 222-5110.

(5) You may view this service information that is incorporated by reference at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, email: fr.inspection@nara.gov, or go to: <https://www.archives.gov/federal-register/cfr/ibr-locations.html>.

Issued on February 3, 2022.

Lance T. Gant, Director,
Compliance & Airworthiness Division,
Aircraft Certification Service.

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